

## SECTION IV.—RIVERS AND FLOODS.

## RIVERS AND FLOODS DURING JANUARY, 1918.

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[Dated: River and Flood Division, Weather Bureau, Mar. 1, 1918.]

A sudden break-up of the ice in the rivers of the northern States and the great interior valleys has been viewed with much apprehension. It is a most significant fact that notwithstanding the knowledge as to the thickness of the ice on the rivers and that its breaking up was an absolute certainty, yet when the break came, and it came under favorable rather than unfavorable circumstances, a loss of probably 50 per cent of the total tonnage of the Ohio and Mississippi below Cairo was sustained. The direct money loss involved is upward of \$2,000,000 and the indirect loss through revenues, etc., is much greater; this loss is particularly felt at this time, since it is practically impossible to replace in 1918 the craft that have been destroyed.

The break came first on the southern tributaries of the Ohio; namely, the Great Kanawha, Guyandotte, Big Sandy, Licking, and Kentucky Rivers, and with the lapse of only a few days the ice on the Green River of Kentucky and both the Cumberland and the Tennessee Rivers broke up at rather high stages.

The direct cause of the break-up was the rains which set in on January 26 and again on the 28th. The rains of the second period were considerably heavier than those of the first. The second period was attended by thawing weather, although the high temperatures lasted probably less than 48 hours, being followed by cold weather on the 29th and 30th.

The Great Kanawha, Guyandotte, Big Sandy, Licking, and Kentucky were the first rivers to respond to the rains of the 28th. The rainfall was augmented by much snow water, and the great quantity of water contributed by the mountain streams soon caused a rise to flood stage and consequently the breaking up of the ice. The latter gorged in many places, and with the breaking of the gorges a vast quantity of water was released, which, with its burden of heavy ice, simply crushed and carried away floating property of all description.

Much damage was done to river craft that had sought refuge, earlier in the season, in the mouths of the respective streams, under the impression that an anchorage there would be a protection from the ice of the main river. It is estimated by a writer in the Evansville Press of January 31, 1918, that 50 per cent of all Ohio and Mississippi River tonnage has been wiped out and that the vessels lost were representative of the best on the river. The loss was particularly heavy at Paducah, Ky., due to the ice from the Tennessee, in conjunction with heavy ice coming down the Ohio.

As before stated, it is a significant fact that vessel interests, although being fully aware of the danger river craft was subject to, were helpless, with the means at

their command, before the tremendous crushing power of the ice floes borne along on the flood wave that swept down the river.

Table of flood losses during January, 1918, not including losses among river craft.

Drainage district.	Tangible property, bridges, buildings, factories, etc.	Farm property.		Suspension of business.	Value of warnings.
		Crops.	Live stock.		
<i>South Atlantic:</i>					
Columbia, S. C.....	\$0	\$0	\$638	\$140	\$31,900
<i>Mississippi:</i>					
Parkersburg, W. Va.....	9,600	0	0	0	.....
Tennessee.....	.....	.....	.....	8,000	.....
<i>East Gulf:</i>					
Alabama rivers.....	1,000	.....	220	950	5,100
Do.....	.....	500	.....	600	.....
Total.....	10,600	500	858	9,690	37,000

At the close of the month the Ohio was badly gorged between Rising Sun and Madison, Ind., also between Evansville and Newburg, Ind. The high stages at Cincinnati were due to backwater from gorges below that city.

The ice in the Mississippi below Cairo was badly gorged at several places, particularly at Osceola, Ark. Below that point much heavy ice passed down the river during the closing days of the month, the southern limit of floating channel ice being between Vicksburg and Natchez, Miss. The channel at the first named place was two-thirds full of floating ice on the 25th.

In a later number of the REVIEW it is hoped to present a detailed report on the ice of the current winter in the Mississippi and its tributaries.

Floods due to rains elsewhere in the south-central regions were infrequent, although flood stages were reached in rivers of North and South Carolina and Alabama as may be seen from the tables below.

There were also destructive floods in the rivers of Washington and Oregon due to heavy rains the last of December, 1917, and the first few days of January, 1918. The damage in Washington was confined to railroad tracks and bridges. Transcontinental lines were tied up several days due to loss of bridges and washouts.

The rivers of New England and the Middle Atlantic States also the northern tributaries of the Ohio were, as a rule, icebound throughout the month.

Hydrographs for typical points on several principal rivers are shown on Chart I. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.

TABLE 1.—Flood stages in Atlantic drainage during January, 1918.

River.	Station.	Flood stage.	Above flood stages—dates.		Crest.	
			From—	To—	Stage.	Date.
		<i>Feet.</i>			<i>Feet.</i>	
Roanoke.....	Weldon, N. C.....	30			27.8	31
Fishing Creek.....	Enfield, N. C.....	14			13.7	31
Neuse.....	Neuse, N. C.....	14	31	(†)	15.4	31
	Smithfield, N. C.....	13	30	(†)	15.3	31
Cape Fear.....	Elizabethtown, N. C.....	22	31	(†)	23.4	31
Great Pee Dee.....	Cheraw, S. C.....	27	31	(†)	30.0	31
Santee.....	Rimini, S. C.....	12	15	21	13.3	18-19
			30	(†)	13.0	31
	Ferguson, S. C.....	12	17	24	13.1	21
Catawba.....	Catawba, S. C.....	11			10.8	30
Wateree.....	Camden, S. C.....	24	31	(†)	27.3	31
Saluda.....	Chapells, S. C.....	14	30	(†)	14.5	31

† Continued into February.

TABLE 2.—Flood stages in the Mississippi drainage during January, 1918.

River.	Station.	Flood stage.	Above flood stages—dates.		Crest.	
			From—	To—	Stage.	Date.
		<i>Feet.</i>			<i>Feet.</i>	
Ohio.....	Portsmouth, Ohio.....	50			49.5	29
	Cincinnati, Ohio.....	50	31	(†)	60.0	31
	Dam 37, Fernbank, Ohio.....	54	31	(†)	54.4	31
Monongahela.....	Fairmont, W. Va.....	25	29	29	25.0	29
	Greensboro, Pa.....	20			18.7	29
Little Kanawha.....	Glenville, W. Va.....	22	29	29	22.7	29
	Creston, W. Va.....	20	29	29	22.0	29
Great Kanawha.....	Charleston, W. Va.....	30			27.7	29
Elk.....	Clay, W. Va.....	18			16.4	29
Tug.....	Williamson, W. Va.....	26	29	29	38.3	29
Big Sandy.....	Lock No. 3, Louisa, Ky.....	50			47.0	29
Green.....	Pikeville, Ky.....	35	28	29	50.0	29
	Lock No. 2, Rumsey, Ky.....	34			30.6	31
	Lock No. 4, Woodbury, Ky.....	33	29	(†)	40.7	31
	Lock No. 6, Brownsville, Ky.....	30	31	(†)	30.1	31
Kentucky.....	Jackson, Ky.....	24	28	29	35.0	29
	Beattyville, Ky.....	30	29	29	45.0	29
	High Bridge, Ky.....	30	31	(†)	31.2	31
Cumberland.....	Frankfort, Ky.....	31			30.2	29
	Williamsburg, Ky.....	22	29	(†)	24.8	31
	Burnside, Ky.....	50	28	30	69.5	29
	Celina, Tenn.....	45	29	(†)	54.5	31
	Carthage, Tenn.....	40	29	(†)	51.2	31
	Nashville, Tenn.....	40	29	(†)	46.1	31
	Dover, Tenn., Lock B.....	49	31	(†)	49.8	31
	Fox Bluff, Tenn., Lock A.....	43	30	(†)	43.9	30
Tennessee.....	Clarksville, Tenn.....	46	30	(†)	48.2	31
	Knoxville, Tenn.....	12			24.2	29
	Loudon, Tenn.....	25			23.5	31
	Chattanooga, Tenn.....	33	30	(†)	33.4	31
	Bridgeport, Ala.....	24	31	(†)	24.5	31
	Guntersville, Ala.....	31			29.4	31
	Flomce, Ala.....	18			17.5	31
	Riverton, Ala.....	32	31	(†)	32.6	31
Clinch.....	Spears Ferry, Va.....	20	29	29	24.5	29
	Clinton, Tenn.....	25	29	(†)	37.6	30
	Kingston, Tenn.....	25	30	(†)	29.0	31
Powell.....	Tazewell, Tenn.....	20	29	29	27.2	29
Little Tennessee.....	McGehee, Tenn.....	20	29	29	20.8	29
Hwassee.....	Charleston, Tenn.....	22			21.5	31
French Broad.....	Penrose, N. C.....	13	28	29	13.6	29
	Asheville, N. C.....	4	28	29	5.0	28
	Dandridge, Tenn.....	12	29	29	15.3	29
Big Pigeon.....	Newport, Tenn.....	6	31	(†)	12.0	29
Holston.....	Rogersville, Tenn.....	14	29	29	5.0	31
Holston (North Fork).....	Mendota, Va.....	8	28	29	20.0	29
Holston.....	Bluff City, Tenn.....	12	31	(†)	14.0	29
					8.0	31
					10.8	28

† Continued into February, 1918.

TABLE 3.—Flood stages in the East Gulf and Columbia River drainages during January, 1918.

River.	Station.	Flood stage.	Above flood stages—dates.		Crest.	
			From—	To—	Stage.	Date.
		<i>Feet.</i>			<i>Feet.</i>	
East Gulf drainage:						
Alabama.....	Selma, Ala.....	35			32.7	15
Tallahassee.....	Milstead, Ala.....	40			38.6	12
Coosa.....	Gadsden, Ala.....	22			21.0	31
Do.....	Lock No. 4, Lincoln, Ala.....	17	31	(†)	18.8	31
Tombigbee.....	Demopolis, Ala.....	39			35.7	31
Black Warrior.....	Tuscaloosa, Ala.....	46	31	(†)	53.9	31
Columbia River drainage:						
Columbia.....	Vancouver, Wash.....	15	(*)	5	14.3	1
Willamette.....	Albany, Oreg.....	20	14	14	20.0	14
Do.....	Eugene, Oreg.....	10	12	15	14.0	12
Do.....	Oregon City, Oreg.....	10	(*)	2	14.5	27
			13	21	11.9	16
Santiam.....	Jefferson, Oreg.....	10	11	12	12.0	11

† Continued into February, 1918.

\* Continued from December, 1917.

## MEAN LAKE LEVELS DURING JANUARY, 1918.

By UNITED STATES LAKE SURVEY.

[Dated: Detroit, Mich., Feb. 5, 1918.]

The following data are reported in the Notice to Mariners of the above date:

Data.	Lakes.*			
	Superior.	Michigan and Huron.	Erie.	Ontario.
Mean level during January, 1918:	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>
Above mean sea level at New York.....	601.93	580.76	571.91	246.07
Above or below—				
Mean stage of December, 1917.....	—0.23	—0.04	—0.72	—0.38
Mean stage of January, 1917.....	—0.82	+0.30	+0.31	+0.81
Average stage for January, last 10 years.....	—0.08	+0.94	+0.28	+0.72
Highest recorded January stage.....	—0.85	—1.91	—1.64	—1.63
Lowest recorded January stage.....	+1.05	+1.68	+0.95	+2.27
Average relation of the January level to—				
December level.....	—0.3	—0.2	±0.0	±0.0
February level.....	+0.2	±0.0	±0.0	—0.2

\* Lake St. Clair's level: In January, 574.04 feet